FACTOR =	0.0501	0.0645	0.0288	0.1434

ACCOUNT 2421.2
AERIAL CABLE EXCH NONMETALLIC
MASSACHUSETTS

TABLE OF INPUT VARIABLES

Original Cost	$1,000.00
Service Life (Years)	25.00
Future Net $alvage	-25.00%
Debt Ratio	45.00%
Cost of Debt	7.70%

Cost of Equity	14.15%
Cost of Invested Capital	11.25%
MACRS Recovery Period (Years)	15.00
Federal Income Tax Rate	35.00%
State Income Tax Rate	6.50%
Composite Income Tax Rate	39.23%

Year	Book Depr. Amount	Book Depr. Reserve	Deferred Inc. Tax Amount	Deferred Inc. Tax Reserve	Investor-supplied Capital Begin	Investor-supplied Capital End	Investor-supplied Capital Avg.	Return Debt	Return Equity	Current Inc. Tax	Total Ann. Chg.	Depreciation	Cost of Money	Income Tax	PV Ann. Chg.
1	25.00	25.00	9.81	9.81		965.19	482.60	16.72	37.56	24.24	103.52	23.70	51.46	22.98	98.15
2	50.00	75.00	17.65	27.46	965.19	897.54	931.37	32.27	72.48	46.78	201.54	42.61	89.28	39.87	171.76
3	50.00	125.00	13.92	41.38	897.54	833.62	865.58	29.99	67.36	43.48	190.83	38.30	74.58	33.31	146.19
4	50.00	175.00	10.57	51.95	833.62	773.05	803.33	27.84	62.52	40.35	180.71	34.43	62.22	27.79	124.44
5	50.00	225.00	7.55	59.51	773.05	715.49	744.27	25.79	57.92	37.38	171.10	30.95	51.82	23.14	105.91
6	50.00	275.00	4.84	64.34	715.49	660.66	688.08	23.84	53.55	34.56	161.95	27.82	43.06	19.23	90.11
7	50.00	325.00	3.55	67.89	660.66	607.11	633.88	21.96	49.33	31.84	153.14	25.01	35.66	15.92	76.59
8	50.00	375.00	3.55	71.44	607.11	553.56	580.33	20.11	45.16	29.15	144.42	22.48	29.35	13.11	64.93
9	50.00	425.00	3.55	74.99	553.56	500.01	526.78	18.25	41.00	26.46	135.71	20.21	23.95	10.69	54.85
10	50.00	475.00	3.55	78.54	500.01	446.46	473.23	16.40	36.83	23.77	127.00	18.16	19.34	8.64	46.14
11	50.00	525.00	3.55	82.09	446.46	392.91	419.68	14.54	32.66	21.08	118.28	16.33	15.41	6.88	38.63
12	50.00	575.00	3.55	85.64	392.91	339.36	366.14	12.69	28.49	18.39	109.57	14.68	12.09	5.40	32.16
13	50.00	625.00	3.55	89.19	339.36	285.81	312.59	10.83	24.33	15.70	100.86	13.19	9.28	4.14	26.61
14	50.00	675.00	3.55	92.74	285.81	232.26	259.04	8.98	20.16	13.01	92.15	11.86	6.91	3.09	21.86
15	50.00	725.00	3.55	96.29	232.26	178.71	205.49	7.12	15.99	10.32	83.43	10.66	4.93	2.20	17.79
16	50.00	775.00	(8.03)	88.26	178.71	136.74	157.73	5.47	12.28	7.92	75.66	9.58	3.40	1.52	14.50
17	50.00	825.00	(19.61)	68.64	136.74	106.36	121.55	4.21	9.46	6.11	69.78	8.61	2.36	1.05	12.02
18	50.00	875.00	(19.61)	49.03	106.36	75.97	91.16	3.16	7.09	4.58	64.83	7.74	1.59	0.71	10.04
19	50.00	925.00	(19.61)	29.42	75.97	45.58	60.77	2.11	4.73	3.05	59.89	6.96	0.95	0.42	8.34
20	50.00	975.00	(19.61)	9.81	45.58	15.19	30.39	1.05	2.36	1.53	54.94	6.26	0.43	0.19	6.87
21	50.00	1,025.00	(19.61)	(9.81)	15.19	(15.19)	(0.00)	(0.00)	(0.00)	(0.00)	50.00	5.62	(0.00)	(0.00)	5.62
22	50.00	1,075.00	(19.61)	(29.42)	(15.19)	(45.58)	(30.39)	(1.05)	(2.36)	(1.53)	45.06	5.06	(0.35)	(0.15)	4.56
23	50.00	1,125.00	(19.61)	(49.03)	(45.58)	(75.97)	(60.78)	(2.11)	(4.73)	(3.05)	40.11	4.54	(0.62)	(0.28)	3.65
24	50.00	1,175.00	(19.61)	(68.64)	(75.97)	(106.36)	(91.16)	(3.16)	(7.09)	(4.58)	35.17	4.08	(0.84)	(0.37)	2.87
25	50.00	1,225.00	(19.61)	(88.26)	(106.36)	(136.74)	(121.55)	(4.21)	(9.46)	(6.11)	30.22	3.67	(1.00)	(0.45)	2.22
26	25.00	1,250.00	88.26		(136.74)	(250.00)	(193.37)	(6.70)	(15.05)	(9.71)	(6.46)	1.65	(1.44)	(0.64)	(0.43)
	1,250.00										Total PV	414.18	533.81	238.39	1186.38
											Annuity	50.07	64.53	28.82	143.42
											Factor	0.0501	0.0645	0.0288	0.1434

	DEP	DEM	TAX	RETN
FACTOR=	0.0561	0.0614	0.0274	0.1449

ACCOUNT 2422.1
UNDERGROUND CA. EXCH METALLIC
MASSACHUSETTS

TABLE OF INPUT VARIABLES

Original Cost	$1,000.00
Service Life (Years)	25.00
Future Net Salvage	-40.00%
Debt Ratio	45.00%
Cost of Debt	7.70%

Cost of Equity	14.15%
Cost of Invested Capital	11.25%
MACRS Recovery Period (Years)	15.00
Federal Income Tax Rate	35.00%
State Income Tax Rate	6.50%
Composite Income Tax Rate	39.23%

Year	Book Depr. Amount	Book Depr. Reserve	Deferred Inc. Tax Amount	Deferred Inc. Tax Reserve	Investor-supplied Capital Begin	Investor-supplied Capital End	Investor-supplied Capital Avg.	Return Debt	Return Equity	Current Inc. Tax	Total Ann. Chg.	Depreciation	Cost of Money	Income Tax	PV Ann. Chg.
1	28.00	28.00	8.63	8.63		963.37	481.69	16.69	37.49	24.19	106.37	26.55	51.37	22.94	100.85
2	56.00	84.00	15.30	23.93	963.37	892.07	927.72	32.15	72.20	46.60	206.94	47.73	88.93	39.71	176.37
3	56.00	140.00	11.57	35.50	892.07	824.50	858.29	29.74	66.80	43.11	195.65	42.90	73.95	33.03	149.88
4	56.00	196.00	8.22	43.72	824.50	760.28	792.39	27.46	61.67	39.80	184.93	38.56	61.37	27.41	127.34
5	56.00	252.00	5.20	48.92	760.28	699.08	729.68	25.28	56.79	36.65	174.72	34.66	50.80	22.69	108.15
6	56.00	308.00	2.48	51.40	699.08	640.60	669.84	23.21	52.13	33.65	164.99	31.16	41.92	18.72	91.80
7	56.00	364.00	1.20	52.59	640.60	583.41	612.00	21.21	47.63	30.74	155.58	28.01	34.43	15.38	77.81
8	56.00	420.00	1.20	53.79	583.41	526.21	554.81	19.22	43.18	27.87	146.27	25.18	28.06	12.53	65.76
9	56.00	476.00	1.20	54.99	526.21	469.01	497.61	17.24	38.73	24.99	136.96	22.63	22.62	10.10	55.35
10	56.00	532.00	1.20	56.18	469.01	411.82	440.42	15.26	34.28	22.12	127.66	20.34	18.00	8.04	46.38
11	56.00	588.00	1.20	57.38	411.82	354.62	383.22	13.28	29.82	19.25	118.35	18.29	14.08	6.29	38.65
12	56.00	644.00	1.20	58.57	354.62	297.43	326.02	11.30	25.37	16.38	109.05	16.44	10.76	4.81	32.01
13	56.00	700.00	1.20	59.77	297.43	240.23	268.83	9.31	20.92	13.50	99.74	14.78	7.98	3.56	26.32
14	56.00	756.00	1.20	60.97	240.23	183.03	211.63	7.33	16.47	10.63	90.43	13.28	5.65	2.52	21.45
15	56.00	812.00	1.20	62.16	183.03	125.84	154.44	5.35	12.02	7.76	81.13	11.94	3.70	1.65	17.30
16	56.00	868.00	(10.39)	51.78	125.84	80.22	103.03	3.57	8.02	5.18	72.76	10.73	2.22	0.99	13.94
17	56.00	924.00	(21.97)	29.81	80.22	46.19	63.21	2.19	4.92	3.17	66.28	9.65	1.22	0.55	11.42
18	56.00	980.00	(21.97)	7.85	46.19	12.16	29.17	1.01	2.27	1.47	60.75	8.67	0.51	0.23	9.41
19	56.00	1,036.00	(21.97)	(14.12)	12.16	(21.88)	(4.86)	(0.17)	(0.38)	(0.24)	55.21	7.80	(0.08)	(0.03)	7.68
20	56.00	1,092.00	(21.97)	(36.09)	(21.88)	(55.91)	(38.90)	(1.35)	(3.03)	(1.95)	49.67	7.01	(0.55)	(0.24)	6.22
21	56.00	1,148.00	(21.97)	(58.05)	(55.91)	(89.95)	(72.93)	(2.53)	(5.68)	(3.66)	44.13	6.30	(0.92)	(0.41)	4.96
22	56.00	1,204.00	(21.97)	(80.02)	(89.95)	(123.98)	(106.96)	(3.71)	(8.32)	(5.37)	38.60	5.66	(1.22)	(0.54)	3.90
23	56.00	1,260.00	(21.97)	(101.99)	(123.98)	(158.02)	(141.00)	(4.89)	(10.97)	(7.08)	33.06	5.09	(1.44)	(0.64)	3.00
24	56.00	1,316.00	(21.97)	(123.95)	(158.02)	(192.05)	(175.03)	(6.06)	(13.62)	(8.79)	27.52	4.57	(1.61)	(0.72)	2.25
25	56.00	1,372.00	(21.97)	(145.92)	(192.05)	(226.08)	(209.07)	(7.24)	(16.27)	(10.50)	21.98	4.11	(1.73)	(0.77)	1.61
26	28.00	1,400.00	145.92		(226.08)	(400.00)	(313.04)	(10.85)	(24.36)	(15.72)	(22.93)	1.85	(2.32)	(1.04)	(1.51)
	1,400.00										Total PV	463.88	507.70	226.73	1198.31
											Annuity	56.08	61.38	27.41	144.87
											Factor	0.0561	0.0614	0.0274	0.1449

FACTOR=	0.0561	0.0614	0.0274	0.1449

ACCOUNT 2422.2
UNDERGROUND CA. EXCH NONMETALLIC
MASSACHUSETTS

TABLE OF INPUT VARIABLES

Original Cost	$1,000.00
Service Life (Years)	25.00
Future Net Salvage	-40.00%
Debt Ratio	45.00%
Cost of Debt	7.70%

Cost of Equity	14.15%
Cost of Invested Capital	11.25%
MACRS Recovery Period (Years)	15.00
Federal Income Tax Rate	35.00%
State Income Tax Rate	6.50%
Composite Income Tax Rate	39.23%

Year	Book Depr. Amount	Book Depr. Reserve	Deferred Inc. Tax Amount	Deferred Inc. Tax Reserve	Investor-supplied Capital Begin	Investor-supplied Capital End	Investor-supplied Capital Avg.	Return Debt	Return Equity	Current Inc. Tax	Total Ann. Chg.	Depreciation	Cost of Money	Income Tax	PV Ann. Chg.
1	28.00	28.00	8.63	8.63		963.37	481.69	16.69	37.49	24.19	106.37	26.55	51.37	22.94	100.85
2	56.00	84.00	15.30	23.93	963.37	892.07	927.72	32.15	72.20	46.60	206.94	47.73	88.93	39.71	176.37
3	56.00	140.00	11.57	35.50	892.07	824.50	858.29	29.74	66.80	43.11	195.65	42.90	73.95	33.03	149.88
4	56.00	196.00	8.22	43.72	824.50	760.28	792.39	27.46	61.67	39.80	184.93	38.56	61.37	27.41	127.34
5	56.00	252.00	5.20	48.92	760.28	699.08	729.68	25.28	56.79	36.65	174.72	34.66	50.80	22.69	108.15
6	56.00	308.00	2.48	51.40	699.08	640.60	669.84	23.21	52.13	33.65	164.99	31.16	41.92	18.72	91.80
7	56.00	364.00	1.20	52.59	640.60	583.41	612.00	21.21	47.63	30.74	155.58	28.01	34.43	15.38	77.81
8	56.00	420.00	1.20	53.79	583.41	526.21	554.81	19.22	43.18	27.87	146.27	25.18	28.06	12.53	65.76
9	56.00	476.00	1.20	54.99	526.21	469.01	497.61	17.24	38.73	24.99	136.96	22.63	22.62	10.10	55.35
10	56.00	532.00	1.20	56.18	469.01	411.82	440.42	15.26	34.28	22.12	127.66	20.34	18.00	8.04	46.38
11	56.00	588.00	1.20	57.38	411.82	354.62	383.22	13.28	29.82	19.25	118.35	18.29	14.08	6.29	38.65
12	56.00	644.00	1.20	58.57	354.62	297.43	326.02	11.30	25.37	16.38	109.05	16.44	10.76	4.81	32.01
13	56.00	700.00	1.20	59.77	297.43	240.23	268.83	9.31	20.92	13.50	99.74	14.78	7.98	3.56	26.32
14	56.00	756.00	1.20	60.97	240.23	183.03	211.63	7.33	16.47	10.63	90.43	13.28	5.65	2.52	21.45
15	56.00	812.00	1.20	62.16	183.03	125.84	154.44	5.35	12.02	7.76	81.13	11.94	3.70	1.65	17.30
16	56.00	868.00	(10.39)	51.78	125.84	80.22	103.03	3.57	8.02	5.18	72.76	10.73	2.22	0.99	13.94
17	56.00	924.00	(21.97)	29.81	80.22	46.19	63.21	2.19	4.92	3.17	66.28	9.65	1.22	0.55	11.42
18	56.00	980.00	(21.97)	7.85	46.19	12.16	29.17	1.01	2.27	1.47	60.75	8.67	0.51	0.23	9.41
19	56.00	1,036.00	(21.97)	(14.12)	12.16	(21.88)	(4.86)	(0.17)	(0.38)	(0.24)	55.21	7.80	(0.08)	(0.03)	7.68
20	56.00	1,092.00	(21.97)	(36.09)	(21.88)	(55.91)	(38.90)	(1.35)	(3.03)	(1.95)	49.67	7.01	(0.55)	(0.24)	6.22
21	56.00	1,148.00	(21.97)	(58.05)	(55.91)	(89.95)	(72.93)	(2.53)	(5.68)	(3.66)	44.13	6.30	(0.92)	(0.41)	4.96
22	56.00	1,204.00	(21.97)	(80.02)	(89.95)	(123.98)	(106.96)	(3.71)	(8.32)	(5.37)	38.60	5.66	(1.22)	(0.54)	3.90
23	56.00	1,260.00	(21.97)	(101.99)	(123.98)	(158.02)	(141.00)	(4.89)	(10.97)	(7.08)	33.06	5.09	(1.44)	(0.64)	3.00
24	56.00	1,316.00	(21.97)	(123.95)	(158.02)	(192.05)	(175.03)	(6.06)	(13.62)	(8.79)	27.52	4.57	(1.61)	(0.72)	2.25
25	56.00	1,372.00	(21.97)	(145.92)	(192.05)	(226.08)	(209.07)	(7.24)	(16.27)	(10.50)	21.98	4.11	(1.73)	(0.77)	1.61
26	28.00	1,400.00	145.92		(226.08)	(400.00)	(313.04)	(10.85)	(24.36)	(15.72)	(22.93)	1.85	(2.32)	(1.04)	(1.51)
	1,400.00										Total PV	463.88	507.70	226.73	1198.31
											Annuity	56.08	61.38	27.41	144.87
											Factor	0.0561	0.0614	0.0274	0.1449

FACTOR=	0.0479	0.0671	0.0300	0.1449

ACCOUNT 2423.1
BURIED CABLE. EXCH METALLIC
MASSACHUSETTS

TABLE OF INPUT VARIABLES

Original Cost	$1,000.00
Service Life (Years)	23.00
Future Net Salvage	-10.00%
Debt Ratio	45.00%
Cost of Debt	7.70%

Cost of Equity	14.15%
Cost of Invested Capital	11.25%
MACRS Recovery Period (Years)	15.00
Federal Income Tax Rate	35.00%
State Income Tax Rate	6.50%
Composite Income Tax Rate	39.23%

Year	Book Depr. Amount	Book Depr. Reserve	Deferred Inc. Tax Amount	Deferred Inc. Tax Reserve	Investor-supplied Capital Begin	Investor-supplied Capital End	Investor-supplied Capital Avg.	Return Debt	Return Equity	Current Inc. Tax	Total Ann. Chg.	Depreciation	Cost of Money	Income Tax	PV Ann. Chg.
1	23.91	23.91	10.23	10.23		965.85	482.93	16.73	37.58	24.26	102.49	22.67	51.50	23.00	97.17
2	47.83	71.74	18.50	28.74	965.85	899.52	932.69	32.32	72.59	46.85	199.58	40.76	89.40	39.93	170.09
3	47.83	119.57	14.78	43.51	899.52	836.92	868.22	30.08	67.57	43.61	189.09	36.64	74.81	33.41	144.86
4	47.83	167.39	11.42	54.94	836.92	777.67	807.30	27.97	62.83	40.55	179.18	32.93	62.53	27.92	123.39
5	47.83	215.22	8.41	63.34	777.67	721.44	749.55	25.97	58.33	37.65	169.78	29.60	52.19	23.31	105.10
6	47.83	263.04	5.69	69.03	721.44	667.92	694.68	24.07	54.06	34.89	160.85	26.61	43.48	19.42	89.50
7	47.83	310.87	4.40	73.43	667.92	615.70	641.81	22.24	49.95	32.24	152.25	23.92	36.11	16.12	76.15
8	47.83	358.70	4.40	77.84	615.70	563.47	589.58	20.43	45.88	29.61	143.75	21.50	29.81	13.31	64.63
9	47.83	406.52	4.40	82.24	563.47	511.24	537.35	18.62	41.82	26.99	135.26	19.33	24.43	10.91	54.66
10	47.83	454.35	4.40	86.64	511.24	459.01	485.13	16.81	37.75	24.37	126.76	17.37	19.82	8.85	46.05
11	47.83	502.17	4.40	91.04	459.01	406.78	432.90	15.00	33.69	21.74	118.26	15.62	15.90	7.10	38.62
12	47.83	550.00	4.40	95.45	406.78	354.55	380.67	13.19	29.63	19.12	109.76	14.04	12.57	5.61	32.22
13	47.83	597.83	4.40	99.85	354.55	302.33	328.44	11.38	25.56	16.50	101.26	12.62	9.75	4.35	26.72
14	47.83	645.65	4.40	104.25	302.33	250.10	276.21	9.57	21.50	13.87	92.77	11.34	7.37	3.29	22.00
15	47.83	693.48	4.40	108.65	250.10	197.87	223.98	7.76	17.43	11.25	84.27	10.20	5.37	2.40	17.97
16	47.83	741.30	(7.18)	101.47	197.87	157.22	177.55	6.15	13.82	8.92	76.71	9.17	3.83	1.71	14.70
17	47.83	789.13	(18.76)	82.71	157.22	128.16	142.69	4.94	11.10	7.17	71.04	8.24	2.76	1.23	12.24
18	47.83	836.96	(18.76)	63.95	128.16	99.09	113.62	3.94	8.84	5.71	66.31	7.41	1.98	0.88	10.27
19	47.83	884.78	(18.76)	45.19	99.09	70.02	84.56	2.93	6.58	4.25	61.58	6.66	1.32	0.59	8.57
20	47.83	932.61	(18.76)	26.43	70.02	40.96	55.49	1.92	4.32	2.79	56.85	5.98	0.78	0.35	7.11
21	47.83	980.43	(18.76)	7.67	40.96	11.89	26.42	0.92	2.06	1.33	52.13	5.38	0.33	0.15	5.86
22	47.83	1,028.26	(18.76)	(11.09)	11.89	(17.18)	(2.64)	(0.09)	(0.21)	(0.13)	47.40	4.84	(0.03)	(0.01)	4.79
23	47.83	1,076.09	(18.76)	(29.85)	(17.18)	(46.24)	(31.71)	(1.10)	(2.47)	(1.59)	42.67	4.35	(0.32)	(0.14)	3.88
24	23.91	1,100.00	29.85	0.00	(46.24)	(100.00)	(73.12)	(2.53)	(5.69)	(3.67)	12.02	1.95	(0.67)	(0.30)	0.98
	1,100.00		0.00								Total PV	389.13	545.01	243.39	1177.53
											Annuity	47.89	67.08	29.96	144.93
											Factor	0.0479	0.0671	0.0300	0.1449

FACTOR =	0.0441	0.0677	0.0302	0.1420

ACCOUNT 2423.2
BURIED CABLE. EXCH NONMETALLIC
MASSACHUSETTS

TABLE OF INPUT VARIABLES

Original Cost	$1,000.00
Service Life (Years)	25.00
Future Net Salvage	-10.00%
Debt Ratio	45.00%
Cost of Debt	7.70%

Cost of Equity	14.15%
Cost of Invested Capital	11.25%
MACRS Recovery Period (Years)	15.00
Federal Income Tax Rate	35.00%
State Income Tax Rate	6.50%
Composite Income Tax Rate	39.23%

Year	Book Depr. Amount	Book Depr. Reserve	Deferred Inc. Tax Amount	Deferred Inc. Tax Reserve	Investor-supplied Capital Begin	Investor-supplied Capital End	Investor-supplied Capital Avg.	Return Debt	Return Equity	Current Inc. Tax	Total Ann. Chg.	Depreciation	Cost of Money	Income Tax	PV Ann. Chg.
1	22.00	22.00	10.98	10.98		967.02	483.51	16.75	37.63	24.29	100.67	20.86	51.56	23.03	95.44
2	44.00	66.00	20.00	30.99	967.02	903.01	935.01	32.40	72.77	46.97	196.13	37.50	89.63	40.03	167.15
3	44.00	110.00	16.28	47.27	903.01	842.73	872.87	30.25	67.93	43.84	186.02	33.71	75.21	33.59	142.51
4	44.00	154.00	12.92	60.19	842.73	785.81	814.27	28.21	63.37	40.90	176.49	30.30	63.07	28.17	121.53
5	44.00	198.00	9.91	70.10	785.81	731.90	758.86	26.29	59.06	38.12	167.47	27.24	52.83	23.59	103.66
6	44.00	242.00	7.19	77.29	731.90	680.71	706.31	24.47	54.97	35.48	158.92	24.48	44.20	19.74	88.43
7	44.00	286.00	5.90	83.19	680.71	630.81	655.76	22.72	51.03	32.94	150.70	22.01	36.89	16.47	75.37
8	44.00	330.00	5.90	89.09	630.81	580.91	605.86	20.99	47.15	30.43	142.58	19.78	30.64	13.68	64.10
9	44.00	374.00	5.90	95.00	580.91	531.00	555.96	19.26	43.27	27.93	134.46	17.78	25.27	11.29	54.34
10	44.00	418.00	5.90	100.90	531.00	481.10	506.05	17.53	39.38	25.42	126.34	15.98	20.68	9.23	45.90
11	44.00	462.00	5.90	106.80	481.10	431.20	456.15	15.81	35.50	22.91	118.22	14.37	16.75	7.48	38.60
12	44.00	506.00	5.90	112.70	431.20	381.30	406.25	14.08	31.62	20.41	110.10	12.92	13.41	5.99	32.32
13	44.00	550.00	5.90	118.61	381.30	331.39	356.34	12.35	27.73	17.90	101.98	11.61	10.58	4.72	26.91
14	44.00	594.00	5.90	124.51	331.39	281.49	306.44	10.62	23.85	15.39	93.86	10.44	8.17	3.65	22.26
15	44.00	638.00	5.90	130.41	281.49	231.59	256.54	8.89	19.97	12.89	85.74	9.38	6.15	2.75	18.28
16	44.00	682.00	(5.68)	124.74	231.59	193.26	212.43	7.36	16.53	10.67	78.56	8.43	4.58	2.04	15.06
17	44.00	726.00	(17.26)	107.48	193.26	166.52	179.89	6.23	14.00	9.04	73.27	7.58	3.49	1.56	12.62
18	44.00	770.00	(17.26)	90.22	166.52	139.78	153.15	5.31	11.92	7.69	68.92	6.81	2.67	1.19	10.67
19	44.00	814.00	(17.26)	72.96	139.78	113.04	126.41	4.38	9.84	6.35	64.57	6.12	1.98	0.88	8.99
20	44.00	858.00	(17.26)	55.70	113.04	86.30	99.67	3.45	7.76	5.01	60.22	5.51	1.40	0.63	7.53
21	44.00	902.00	(17.26)	38.44	86.30	59.56	72.93	2.53	5.68	3.66	55.87	4.95	0.92	0.41	6.28
22	44.00	946.00	(17.26)	21.18	59.56	32.82	46.19	1.60	3.59	2.32	51.52	4.45	0.53	0.23	5.21
23	44.00	990.00	(17.26)	3.92	32.82	6.08	19.45	0.67	1.51	0.98	47.16	4.00	0.20	0.09	4.29
24	44.00	1,034.00	(17.26)	(13.34)	6.08	(20.66)	(7.29)	(0.25)	(0.57)	(0.37)	42.81	3.59	(0.07)	(0.03)	3.50
25	44.00	1,078.00	(17.26)	(30.60)	(20.66)	(47.40)	(34.03)	(1.18)	(2.65)	(1.71)	38.46	3.23	(0.28)	(0.13)	2.82
26	22.00	1,100.00	30.60	(0.00)	(47.40)	(100.00)	(73.70)	(2.55)	(5.74)	(3.70)	10.01	1.45	(0.55)	(0.24)	0.66
	1,100.00		(0.00)								Total PV	364.48	559.91	250.05	1174.44
											Annuity	44.06	67.69	30.23	141.98
											Factor	0.0441	0.0677	0.0302	0.1420

FACTOR=	0.0200	0.0763	0.0341	0.1304

ACCOUNT 2441
CONDUIT SYSTEMS
MASSACHUSETTS

TABLE OF INPUT VARIABLES

Original Cost	$1,000.00
Service Life (Years)	55.00
Future Net Salvage	-10.00%
Debt Ratio	45.00%
Cost of Debt	7.70%

Cost of Equity	14.15%
Cost of Invested Capital	11.25%
MACRS Recovery Period (Years)	15.00
Federal Income Tax Rate	35.00%
State Income Tax Rate	6.50%
Composite Income Tax Rate	39.23%

Year	Book Deprr.		Deferred Inc. Tax		Investor-supplied Capital			Return		Current	Total	Depreciation	Cost of	Income	PV
	Amount	Reserve	Amount	Reserve	Begin	End	Avg.	Debt	Equity	Inc. Tax	Amt. Chg.		Money	Tax	Amt. Chg.
1	10.00	10.00	15.69	15.69		974.31	487.16	16.88	37.91	24.47	89.26	9.48	51.95	23.20	84.63
2	20.00	30.00	29.42	45.11	974.31	924.89	949.60	32.90	73.90	47.70	174.50	17.04	91.03	40.65	148.72
3	20.00	50.00	25.69	70.80	924.89	879.20	902.05	31.26	70.20	45.31	166.77	15.32	77.72	34.71	127.76
4	20.00	70.00	22.34	93.14	879.20	836.86	858.03	29.73	66.78	43.10	159.61	13.77	66.46	29.68	109.91
5	20.00	90.00	19.32	112.46	836.86	797.54	817.20	28.32	63.60	41.05	152.96	12.38	56.90	25.41	94.68
6	20.00	110.00	16.60	129.06	797.54	760.94	779.24	27.00	60.64	39.14	146.79	11.13	48.77	21.78	81.67
7	20.00	130.00	15.32	144.38	760.94	725.62	743.28	25.75	57.85	37.33	140.93	10.00	41.81	18.67	70.49
8	20.00	150.00	15.32	159.70	725.62	690.30	707.96	24.53	55.10	35.56	135.19	8.99	35.80	15.99	60.78
9	20.00	170.00	15.32	175.01	690.30	654.99	672.64	23.31	52.35	33.79	129.44	8.08	30.58	13.65	52.31
10	20.00	190.00	15.32	190.33	654.99	619.67	637.33	22.08	49.60	32.01	123.70	7.27	26.04	11.63	44.94
11	20.00	210.00	15.32	205.65	619.67	584.35	602.01	20.86	46.85	30.24	117.95	6.53	22.11	9.87	38.52
12	20.00	230.00	15.32	220.97	584.35	549.03	566.69	19.64	44.10	28.46	112.20	5.87	18.71	8.36	32.94
13	20.00	250.00	15.32	236.28	549.03	513.72	531.38	18.41	41.35	26.69	106.46	5.28	15.77	7.04	28.09
14	20.00	270.00	15.32	251.60	513.72	478.40	496.06	17.19	38.61	24.92	100.71	4.74	13.23	5.91	23.89
15	20.00	290.00	15.32	266.92	478.40	443.08	460.74	15.96	35.86	23.14	94.96	4.26	11.05	4.93	20.25
16	20.00	310.00	3.74	270.65	443.08	419.35	431.22	14.94	33.56	21.66	90.16	3.83	9.30	4.15	17.28
17	20.00	330.00	(7.85)	262.81	419.35	407.19	413.27	14.32	32.16	20.76	87.24	3.45	8.01	3.58	15.03
18	20.00	350.00	(7.85)	254.96	407.19	395.04	401.12	13.90	31.22	20.15	85.26	3.10	6.99	3.12	13.20
19	20.00	370.00	(7.85)	247.12	395.04	382.88	388.96	13.48	30.27	19.54	83.29	2.78	6.09	2.72	11.59
20	20.00	390.00	(7.85)	239.27	382.88	370.73	376.81	13.06	29.32	18.93	81.31	2.50	5.30	2.37	10.17
21	20.00	410.00	(7.85)	231.43	370.73	358.57	364.65	12.64	28.38	18.32	79.33	2.25	4.61	2.06	8.92
22	20.00	430.00	(7.85)	223.58	358.57	346.42	352.50	12.21	27.43	17.71	77.35	2.02	4.01	1.79	7.82
23	20.00	450.00	(7.85)	215.74	346.42	334.26	340.34	11.79	26.49	17.10	75.37	1.82	3.48	1.55	6.85
24	20.00	470.00	(7.85)	207.89	334.26	322.11	328.19	11.37	25.54	16.48	73.40	1.63	3.02	1.35	6.00
25	20.00	490.00	(7.85)	200.05	322.11	309.95	316.03	10.95	24.60	15.87	71.42	1.47	2.61	1.17	5.24
26	20.00	510.00	(7.85)	192.20	309.95	297.80	303.88	10.53	23.65	15.26	69.44	1.32	2.26	1.01	4.58
27	20.00	530.00	(7.85)	184.36	297.80	285.64	291.72	10.11	22.70	14.65	67.46	1.19	1.95	0.87	4.00
28	20.00	550.00	(7.85)	176.51	285.64	273.49	279.57	9.69	21.76	14.04	65.49	1.07	1.68	0.75	3.49
29	20.00	570.00	(7.85)	168.67	273.49	261.33	267.41	9.27	20.81	13.43	63.51	0.96	1.44	0.64	3.04
30	20.00	590.00	(7.85)	160.82	261.33	249.18	255.26	8.84	19.87	12.82	61.53	0.86	1.24	0.55	2.65
31	20.00	610.00	(7.85)	152.98	249.18	237.02	243.10	8.42	18.92	12.21	59.55	0.77	1.06	0.47	2.31
32	20.00	630.00	(7.85)	145.13	237.02	224.87	230.95	8.00	17.97	11.60	57.58	0.70	0.90	0.40	2.00
33	20.00	650.00	(7.85)	137.29	224.87	212.71	218.79	7.58	17.03	10.99	55.60	0.63	0.77	0.34	1.74
34	20.00	670.00	(7.85)	129.44	212.71	200.56	206.64	7.16	16.08	10.38	53.62	0.56	0.65	0.29	1.51
35	20.00	690.00	(7.85)	121.60	200.56	188.40	194.48	6.74	15.14	9.77	51.64	0.51	0.55	0.25	1.31
36	20.00	710.00	(7.85)	113.75	188.40	176.25	182.33	6.32	14.19	9.16	49.67	0.45	0.47	0.21	1.13
37	20.00	730.00	(7.85)	105.91	176.25	164.09	170.17	5.90	13.24	8.55	47.69	0.41	0.39	0.17	0.97
38	20.00	750.00	(7.85)	98.06	164.09	151.94	158.02	5.48	12.30	7.94	45.71	0.37	0.33	0.15	0.84
39	20.00	770.00	(7.85)	90.22	151.94	139.78	145.86	5.05	11.35	7.33	43.73	0.33	0.27	0.12	0.72
40	20.00	790.00	(7.85)	82.37	139.78	127.63	133.71	4.63	10.41	6.72	41.75	0.30	0.22	0.10	0.62
41	20.00	810.00	(7.85)	74.53	127.63	115.47	121.55	4.21	9.46	6.11	39.78	0.27	0.18	0.08	0.53
42	20.00	830.00	(7.85)	66.68	115.47	103.32	109.40	3.79	8.51	5.49	37.80	0.24	0.15	0.07	0.45
43	20.00	850.00	(7.85)	58.84	103.32	91.16	97.24	3.37	7.57	4.88	35.82	0.22	0.12	0.05	0.39
44	20.00	870.00	(7.85)	50.99	91.16	79.01	85.09	2.95	6.62	4.27	33.84	0.19	0.09	0.04	0.33
45	20.00	890.00	(7.85)	43.15	79.01	66.85	72.93	2.53	5.68	3.66	31.87	0.17	0.07	0.03	0.28
46	20.00	910.00	(7.85)	35.30	66.85	54.70	60.78	2.11	4.73	3.05	29.89	0.16	0.05	0.02	0.23
47	20.00	930.00	(7.85)	27.46	54.70	42.54	48.62	1.68	3.78	2.44	27.91	0.14	0.04	0.02	0.20
48	20.00	950.00	(7.85)	19.61	42.54	30.39	36.47	1.26	2.84	1.83	25.93	0.13	0.03	0.01	0.16
49	20.00	970.00	(7.85)	11.77	30.39	18.23	24.31	0.84	1.89	1.22	23.96	0.11	0.02	0.01	0.14
50	20.00	990.00	(7.85)	3.92	18.23	6.08	12.16	0.42	0.95	0.61	21.98	0.10	0.01	0.00	0.11
51	20.00	1,010.00	(7.85)	(3.92)	6.08	(6.08)	0.00	0.00	0.00	0.00	20.00	0.09	0.00	0.00	0.09
52	20.00	1,030.00	(7.85)	(11.77)	(6.08)	(18.23)	(12.15)	(0.42)	(0.95)	(0.61)	18.02	0.08	(0.01)	(0.00)	0.07
53	20.00	1,050.00	(7.85)	(19.61)	(18.23)	(30.39)	(24.31)	(0.84)	(1.89)	(1.22)	16.04	0.07	(0.01)	(0.00)	0.06
54	20.00	1,070.00	(7.85)	(27.46)	(30.39)	(42.54)	(36.46)	(1.26)	(2.84)	(1.83)	14.07	0.07	(0.01)	(0.01)	0.05
55	20.00	1,090.00	(7.85)	(35.30)	(42.54)	(54.70)	(48.62)	(1.68)	(3.78)	(2.44)	12.09	0.06	(0.02)	(0.01)	0.04
56	10.00	1,100.00	35.30		(54.70)	(100.00)	(77.35)	(2.68)	(6.02)	(3.89)	(2.58)	0.03	(0.02)	(0.01)	(0.01)

Total PV	177.56	676.19	301.98	1155.73
Annuity	20.03	76.27	34.06	130.36
Factor	0.0200	0.0763	0.0341	0.1304

C

Before the
FEDERAL COMMUNICATIONS COMMISSION
WASHINGTON, D.C. 20554

In the Matter of	)	
	)	
Application by Verizon New England Inc.,	)	
Bell Atlantic Communications, Inc.,	)	
(d/b/a Verizon Long Distance), NYNEX	)	CC Docket No. 00-176
Long Distance Company (d/b/a Verizon	)	
Enterprise Solutions), and Verizon Global	)	
Networks Inc., for Authorization to Provide	)	
In-Region, InterLATA Services in Massachusetts	)	

JOINT REPLY DECLARATION OF A. DANIEL KELLEY AND RICHARD A. CHANDLER ON BEHALF OF WORLDCOM, INC.

November 3, 2000

Joint Reply Declaration of A. Daniel Kelley and Richard A. Chandler

I. INTRODUCTION

1. We have been asked by WorldCom, Inc. ("WorldCom") to comment on local switching cost trends. We show that switching costs are falling over time due to the combination of growth in minutes, economies of scale and improvements in technology. Therefore, rates established in proceedings that used switching costs from several years ago are likely excessive, even if appropriate TELRIC principles were used to calculate those costs.

II. QUALIFICATIONS

2. Daniel Kelley filed a Declaration on behalf of WorldCom in this proceeding on October 16, 2000. His qualifications are summarized there.

3. Richard Chandler is a Senior Vice President of HAI Consulting, Inc. He holds BSEE and MSEE degrees from the University of Missouri in electronic engineering and an MBA from the University of Denver. He has taught courses in digital switching and other telecommunications technologies at the University of Colorado and the University of Denver. He was employed by Bell Labs from 1977 to 1981. At Bell Labs he participated in digital switch development and design. He is a principal developer of the HAI and Hatfield cost models and has filed declarations and affidavits concerning telecommunications switching and other technologies before the Federal Communications Commission, several state regulatory commissions, the U.S. District Court for the District of Columbia, the U.S Patent Office, and the International Trade Administration, U.S. Department of Commerce.

III. THE GROWTH IN MINUTES AND RATE STRUCTURE ISSUES

4. Between 1990 and 1996, Verizon Massachusetts Dial Equipment Minutes ("DEMs") grew at a compounded annual rate of approximately three percent. Between 1996 and 1999, the compounded annual rate of growth in DEMs was five percent, and the corresponding rate of growth in DEMs per line was two percent.[1] The phenomenal growth of the Internet began around 1996, and this growth provides the best available evidence for this substantial increase in the rate of growth of DEMs. Internet calls tend to last much longer than local calls for voice or fax, so they generate a disproportionate number of DEMs.

5. The price of the local switching unbundled network element ("UNE") is calculated as the traffic-sensitive cost of local switching divided by total switch minutes. The traffic inputs for the UNE cost study that Verizon submitted to the Massachusetts Commission are based on usage prior to 1996. The switching rates which Verizon now wishes to use are based on the results of a 1997 New York Commission Order.[2] As discussed below, there are significant economies of scale in switching. The implication is that switching charges based on the TELRIC cost of local switches should be declining.

IV. ECONOMIES OF SCALE IN SWITCHING

6. The TELRIC cost of local switching consists of capital-related and operating costs. The capital-related component includes the cost of the switch itself, the cost of

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[1] Computed from FCC ARMIS data. It is important to note that DEMs are reported for residential and business lines in total and that, as a result, increases in residential DEMs from increased dial-up Internet access traffic are masked to some extent by the fact that much business e-mail and Internet access traffic is being moved off the switched network. This is discussed further in ¶ 11.

[2] See New York Public Service Commission, Opinion and Order Setting Rates for First Group of Network Elements, Opinion No. 97-2, Case 95-C-0647, pp. 110-113. Of course, the new Verizon rates are not supported by any Massachusetts-specific cost study.

installing the switch, the cost of the building housing the switch, and the cost of providing power to the switch.

7. A number of factors influence the forward-looking cost of the switch itself. So-called "circuit switches," or switching machines of the type historically used by telephone companies to switch telephone traffic, consist of three functional divisions: periphery, control, and switch fabric. The periphery contains the line and trunk interfaces, or ports.

8. The control structure includes processor complexes performing call processing, maintenance, and other functions. The switch fabric provides communications paths between and among ports and service circuits. The processor structure is limited by its "real time" capacity, which is an expression of the quantity of processor "cycles" available to perform time-sensitive tasks such as processing calls, invoking subscriber features, performing maintenance routines, processing signaling messages, etc. The switch fabric, sometimes called the switch matrix, is limited by the number of simultaneous connections between ports that it can support.

9. The switch control structure is most heavily involved in a telephone call when the call is being established. Therefore, the switch real-time limit is often quantified in terms of the number of busy-hour call attempts the processor complex can handle. Similarly, because the switch fabric can support a finite number of simultaneous connections, its capacity is affected by total busy-hour traffic. Thus, long-holding-time traffic affects the switch fabric capacity more than it affects the processor real-time capacity, while an increased calling rate, expressed in terms of busy-hour call attempts, affects the processor capacity more than the switch fabric.

10. One important factor in determining whether an increase in DEMs would cause an increase in TELRIC costs is whether the increase in DEMs occurs during the busy hour. If all of the increase is outside the busy hour, there will be no need to increase either the processor or fabric capacity. Given the way in which switching charges are calculated, the increased usage will result in reduced UNE rates.

11. In fact, the busy hour usage is not likely to be significantly affected by the growth of the Internet. In most switches the busy hour demand is driven by business usage. Businesses increasingly use dedicated access, typically some form of digital subscriber line such as ADSL, to reach the Internet, as do some heavy residential users, who increasingly use ADSL or cable modems. The minutes flowing over dedicated access facilities are not included in DEM measurements.

12. Increases in dial-up Internet traffic are unlikely to exhaust the capacity of switches. Internet-driven increases in call holding times should not lead to exhaust because Internet traffic tends to peak at night, much later than the typical busy hours in the afternoon and early evening. Thus, this traffic uses switch capacity that would otherwise lie unused. Because handling additional Internet traffic is likely to use otherwise idle capacity and not require additional investment in switching capacity, switch usage costs, expressed as switch traffic-sensitive cost per minute of use, will decrease with increasing usage.[3]

13. In any event, even if increased Internet traffic occurs during switch busy hours, costs will not increase in direct proportion to usage. A significant portion of

[3] Modern switches are "essentially nonblocking," in that the probability that users are blocked by their serving end office switch is infinitesimal. Some switches, *e.g.*, current Nortel end offices, are fully nonblocking, which means that there is a guaranteed path through the switch fabric for every equipped line.

switching investment is in buildings and power. These expenses are likely invariant over a wide range of switch sizes. A switch designed to carry 10 percent more busy-hour minutes will require no more space or power than a smaller switch.

14. Moreover, the increase in the processor or fabric cost component of TELRIC costs due to increased usage per minute will not be proportional to the increase in usage. Processor and switch fabric investments consist of both fixed and variable components. The fixed components include power, cabinets, equipment shelves, and, depending on the hardware architecture, initial processor and memory configurations. Variable components may include additional processor and memory circuit boards for the processor complex and fabric components for the switch. The fixed component of the investment will be spread over an increasing number of lines and minutes of use as line and usage demand increases, resulting in economies of scale in both the processor structure and switch fabric.

15. Maintenance expenses are also unlikely to increase in proportion to switch investment and capacity. The Table below summarizes digital switch maintenance costs, expressed per line and per DEM, for Verizon Massachusetts from 1996 through 1999. The numbers increase considerably between 1996 and 1997, then drop for the following two years to levels significantly below those of 1996. The rise in 1997 may be due to an unusual one-time expense or adjustment. In any case, the data show decreasing cost from 1997 through 1999, and for the entire period. This is what one would expect of modern switching systems facing increasing demand.

See http://www.nortelnetworks.com/products/01/dms100/supernode/enet_switch.html. These facts call into question the entire justification for usage-based switching charges in a forward-looking network.

Year	Annual switch maintenance expense per line	Switching maintenance expense per DEM
1996	$13.81	$ 0.00073
1997	$19.65	$ 0.00101
1998	$16.16	$ 0.00078
1999	$11.85	$ 0.00056

V. TECHNOLOGICAL CHANGE

16. Switches have benefited from the same improvements in processor technology that over the past several years have profoundly increased the processing speed of personal and other computers. The Commission has recognized this fact in its various cost modeling orders. The regression equation used to estimate switch costs includes a time component designed to recognize the historical improvement in switch technology. The Commission's switching cost regression equation shows that technology has been driving switch costs down faster than inflation is causing increases in switch cost components. In fact, the switching cost per line fell by almost four percent (from $87.00 to $83.64) in only one year (January 1999 to January 2000) due to technological change.[4] This reduction is independent of the cost reductions due to higher volumes discussed in the next section.

VI. THE FCC'S SYNTHESIS MODEL DEMONSTRATES THE ECONOMIES OF SCALE INHERENT IN SWITCHING SYSTEM DESIGN AND ILLUSTRATES DECREASING USAGE COST WITH INCREASED USAGE

17. Economies of scale in switching are readily illustrated by performing tests of the sensitivity of switch usage cost to increased usage using the FCC's Synthesis Model.

[4] The Commission's regression analysis can be found at Federal-State Joint Board on Universal Service, Forward-Looking Mechanism for High Cost Support for Non-Rural LECs, Tenth Report and Order, CC Docket Nos. 96-45, 07-160, FCC 99-304, released November 2, 1999, Appendix C. CBO inflation data were used to bring the FCC's estimate forward one year. See Congressional Budget Office, The Budget and Economic Outlook: Fiscal Years 2001-2010 (Table 1-6 corrected 2/1/00), downloaded from http://www.cbo.gov.

The Synthesis Model Switching and Interoffice Module estimates, among other items, end office switching investment according to statistics for total usage (in terms of DEMs) filed by telephone companies.

18. We used the Synthesis Model to estimate how changes in DEMs would affect the cost of switching for Verizon Massachusetts. The default run produced an end office per-minute usage cost of $0.0013 per minute for 1998. We then altered the usage inputs to reflect the increase in DEMs between 1998 (the last year for which we had complete DEM data) and October 2000, which came to 13.5 percent.[5] The following table shows the resulting decrease in switch usage cost per minute. These estimates do not reflect cost reductions due to technological change.

total DEMs	Estimated EO usage cost per minute	Change
1996	$0.00155	
1998	$0.00130	-16.1%
Estimated October 2000	$0.00114	-26.5%

19. This table shows that, using the FCC switching model, the estimated growth in minutes causes estimated end office switch usage cost to fall by 26.5 percent from 1996 to October 2000. The results in this Table do not reflect the effects of technological change and inflation. As discussed above, after adjusting for inflation, technological change causes net switching costs to decline.

20. The Synthesis Model switching module recognizes the three switch capacity limits described earlier in its switching investment calculations. For each wire center in

[5] We extrapolated the growth in total DEMs from 1998 to October of 2000 by applying the average annual growth rate in total DEMs from 1995 to 1998.

the study area being modeled, it checks the local demand in terms of lines, busy-hour call attempts, and busy-hour offered traffic against input capacity limits to determine how many switches are required to meet the dominant demand. The results reported here clearly show the effects of economies of scale in the switching cost.

VI. CONCLUSION

21. There are significant economies of scale in switching. These scale economies, together with the growth in minutes being experienced by Verizon Massachusetts, result in significantly lower switched access prices over time. Technological change has also reduced, and is continuing to reduce, switching costs.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on November 2, 2000.

A. Daniel Kelley

Richard A. Chandler

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FEDERAL COMMUNICATIONS COMMISSION
WASHINGTON, D.C. 20554

In the Matter of	)	
	)	
Application by Verizon New England Inc.	)	
Bell Atlantic Communications, Inc.	)	
(d/b/a Verizon Long Distance), NYNEX	)	CC Docket No. 00-176
Long Distance Company (d/b/a Verizon	)	
Enterprise Solutions), and Verizon Global	)	
Networks Inc., for Authorization to Provide	)	
In-Region, InterLATA Services in Massachusetts	)	
	)	

JOINT REPLY DECLARATION
OF PATTY KWAPNIEWSKI AND SHERRY LICHTENBERG
ON BEHALF OF WORLDCOM, INC.

Based on our personal knowledge and on information learned in the course of our duties, we, Patty Kwapniewski and Sherry Lichtenberg, declare as follows:

1. We are the same Patty Kwapniewski and Sherry Lichtenberg who previously filed a declaration in this proceeding. The purpose of this declaration is to explain why we continue to believe that Verizon has not shown that its OSS is operationally ready. We will not repeat here the detailed explanation we previously provided of the defects in Verizon's OSS. Instead, we will respond to the comments made by the Massachusetts DTE in concluding that Verizon's OSS is ready. We do note that many of our criticisms of Verizon's OSS are supported by other CLECs. For example, the Association of Communications Enterprises ("ASCENT") states that many of its members continue to experience problems with inability to

access pre-ordering OSS, poor responsiveness of Verizon's help desk, flawed documentation and missing notifiers. ASCENT Comments at 8-11.

2. As we explained in our prior declaration, fundamental to our conclusion that Verizon has not shown its OSS to be ready is Verizon's lack of experience with that OSS. In concluding that Verizon's OSS is ready, the DTE repeatedly points to Verizon's performance data in Massachusetts, yet that data is based on very limited experience. It is based on almost no experience with UNE-P orders placed via EDI. Thus, the data is of minimal usefulness in evaluating the ability of Verizon's OSS to support ubiquitous residential competition at commercial volumes.

3. The DTE also emphasizes the conclusions of KPMG. Yet the DTE does not explain why KPMG's conclusions are trustworthy given that KPMG, at the direction of the DTE, did not require root cause analysis, did not truly conduct a military style test, did not fully test LSOG 4 interfaces and failed to find defects that were found in other testing. Kwapniewski & Lichtenberg Joint Declaration ("Kwapniewski Decl.") ¶¶ 58-69. In fact, the DTE states that it bases its conclusion of OSS readiness primarily on Verizon's LSOG 2 interfaces, not its LSOG 4 interfaces, DTE Eval. at 229, even though, as we have explained, CLECs will not use the LSOG 2 interfaces if they ever enter the Massachusetts market in significant volumes. Kwapniewski Decl. ¶¶ 63-65.

4. Not only does the KPMG test fail to show the readiness of Verizon's OSS, it actually reveals important defects in Verizon's OSS. As the DTE reports but then ignores, KPMG found that even after systems improvements, Verizon failed to return any response on

2% of pre-order transactions. DTE Eval. at 137-38. KPMG found that Verizon failed to return readily comprehensible error messages on pre-order transactions – something the DTE does not discuss. Kwapniewski Decl. ¶ 53. And KPMG found numerous other problems with Verizon's OSS, which have not been explained by either KPMG or the DTE. Id. at ¶¶ 50-57. [1/]

5. One vital problem KPMG found to exist to some extent in Massachusetts is a problem with missing notifiers. Verizon failed to return PCNs or BCNs on approximately 2.3% of KPMG's orders during the functionality test and returned many others late. Kwapniewski Decl. ¶ 41. Verizon attributed this failure with respect to PCNs primarily to what it termed "minor systems glitches" and failed to provide any explanation for the missing BCNs. VZ-MA Supplemental OSS Aff. (App. B, Tab 494, ¶ 76). This is particularly alarming in light of CLEC problems with missing notifiers in New York – which escalated rapidly after they were initially described as caused by minor glitches – and WorldCom's current experience with missing notifiers in Pennsylvania.

6. The DTE fails to provide any assurance that the problem with missing notifiers will not be repeated in Massachusetts. Partly this is because at the time of the Massachusetts hearings, the missing notifier problem seemed to have been resolved in New

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1/ The DTE does attempt to explain away Verizon's failure to return accurate information on 64% of address validation responses at the pre-order stage. The DTE reports Verizon's response that these errors were unique to the test environment which required manual entry. DTE Eval. at 139 n. 279. But Verizon apparently did not provide this response to KPMG or, in any event, did not convince KPMG that this was so. KPMG did not vouch for the accuracy of Verizon's statement and there is no commercial data showing the statement is correct. To the contrary, KPMG stated that the problem was a potential impediment to CLECs. (Aug 28 Tr. at 3246 (VZ-MA App. B, Tab 545).) Moreover, Verizon's explanation further points out the general problem with reliance on manual processing, something Verizon continues to rely on far too much.

York and had not yet appeared to any significant extent in other Verizon states. Thus, the DTE was unaware that after WorldCom launched service in Pennsylvania in August and began submitting an increasing number of orders, it did not receive all required notifiers on a high percentage of orders. Verizon's failure to return notifiers in Pennsylvania significantly increases concern that the problem will be repeated in Massachusetts. It is now apparent that Verizon's New York fixes did not resolve the missing notifier problem throughout the Verizon region. And it is also clear that in both states in which CLECs began submitting orders in increasing volumes, a problem with missing notifiers developed.

7. The problem in Pennsylvania is ongoing. As of October 26, 2000, WorldCom was missing BCNs on 7.9% of its orders placed in August for which BCNs were past due; WorldCom was missing BCNs on 13.6% of its orders placed in September for which BCNs were past due, and WorldCom was missing BCNs on 24.5% of its orders placed between October 1 and October 15 for which BCNs were past due. These numbers are somewhat of an improvement from those at the time of our original declaration. Verizon has managed to reduce the scope of the problem in recent days after devoting a team of representatives to reflowing the missing notifiers. However, Verizon has not promised to continue to devote representatives to transmitting the notifiers after section 271 approval – and, in any event, this approach is unlikely to work as volumes increase. Indeed, it is not working well enough even now. The number of notifiers that are missing remains far too high.

8. There is little reason to believe that the missing notifier problem will remain confined to Pennsylvania. Verizon has now provided WorldCom with several different

explanations for the missing notifiers. Among these are a number of systems problems that Verizon has now promised to fix in upcoming releases. Assuming that these problems are the actual cause, something of which we will not be confident until we see that the promised fixes actually resolve the problem, we have no reason to believe that these systems problems affect only the systems in Pennsylvania. For example, Verizon states that one reason for its failure to return BCNs is that the BCN sometimes moves ahead of the PCN in Verizon's systems, causing the order to error out – something we assume could happen in Massachusetts as well as in Pennsylvania. Indeed, some of the causes that Verizon has identified for missing notifiers are similar to those that Verizon previously identified as causing missing notifiers in New York. Thus, in New York, Verizon identified one source of missing noifiers as post completion discrepancies ("PCDs"), differences between the information on the service order and information on the customer service record, which require an order to be manually closed out to billing. Verizon has also identified PCDs as a cause of missing BCNs in Pennsylvania.

9. There is already evidence that the missing notifier problem may be repeated in Massachusetts if order volumes increase. In addition to Verizon's failure to return all PCNs and BCNs during KPMG's functionality test, commercial data suggest the likelihood of a problem. As the DTE reports, even with extremely small order volumes, Verizon failed to meet the performance standards for BCN timeliness for resale orders in April, May and June and for UNE orders in June. DTE Eval. at 174.[2/] Moreover, under its own analysis, Verizon failed

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2/ Verizon claims that these failures resulted from inaccurate time stamps, a problem ostensibly fixed in August. DTE Eval. at 174. But the result of the allegedly inaccurate time stamps is that Verizon has no data to show it is returning BCNs in a timely manner.

entirely to return PCNs on 3% of AT&T's eligible orders and BCNs on 5% of AT&T's eligible orders – an entirely unacceptable level even if Verizon's calculations, rather than AT&T's, are accurate. DTE Eval. at 182.[3/] Importantly, as we emphasized in our original declaration, the performance data reported by Verizon in its original application almost certainly understate the problem. Verizon's data only include notifiers that were actually returned; Verizon failed entirely to report data on the measures designed in New York to track missing notifiers. Kwapniewski Decl. ¶ 43 & n.7.

10. Verizon still is not reporting data under the measures developed pursuant to the FCC Consent Decree in New York. However, since the time of its application, Verizon has begun reporting data under measures similar to one of the measures developed in New York pursuant to the Consent Decree (OR 4-09). In OR 4-06, 4-07, and 4-08, Verizon reports data that show the percentage of orders that make it from the Service Order Processor ("SOP") after completion to the billing systems within 1 day and 5 days. (The time it takes to then generate a BCN is not included in the measures.)[4/] There is too little data from August and September to draw any firm conclusions, but the data there is does suggest that a problem exists. In September, for example, for UNE-P and special services orders, almost 10% of orders took

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3/ AT&T also stated that Verizon returned incorrect notifiers on cancellation orders. DTE Eval. at 183. The DTE cites Verizon's statement that it fixed this problem and will in the future return correct notifications. Id. at 184. But there is no evidence that this is actually occurring.

4/ These measures existed in New York prior to the Consent Decree. These measures are parity measures and Verizon is not yet reporting data on its own retail performance. In contrast, OR 4-09, which was developed in New York pursuant to the Consent Decree, establishes a set benchmark whereby 95% of BCNs must go from the SOP to bill completion within 3 days.

longer than a day to post to billing and more than 4% took longer than 5 days. (OR 4-07, 4-08). The problem is likely to grow substantially worse if order volumes increase significantly.

11. In addition to a significant potential problem with missing notifiers, Verizon has an ongoing problem in providing adequate technical assistance to CLECs. As we explained in our original declaration, Verizon consistently releases poor documentation, fails to resolve trouble tickets through its help desk in a timely manner and is proceeding with release of its ExpressTrak system outside the bounds of change management. After summarizing evidence in the record, the DTE asserts in conclusory fashion that Verizon's technical assistance is adequate. DTE Eval. at 117-18. But the DTE is wrong.

12. Each time Verizon releases new documentation, the documentation is marred with errors. Indeed, the DTE acknowledges that as a result of problems with Verizon's documentation for its February 2000 LSOG 4 release that release did not go as well "as planned." DTE Eval. at 80. However, the DTE points to Verizon's claim "that all of the problems with the February release have been resolved, and that the resolution of these problems with the February release will prevent the same problems from arising again future releases." Id. But this promise has proven false. Verizon's June 2000 release for LSOG 2 and LSOG 4 was beset with documentation errors. KPMG, through Hewlett Packard, found numerous errors, and WorldCom, in its own testing of that release in Pennsylvania and New York, also found numerous errors. Kwapniewski Decl. ¶¶ 79-82. The DTE does not explain how it can conclude that Verizon's technical assistance is adequate when KPMG found substantial errors in the June release as well as the February release.